SGS-THOMSON MICROELECTRONICS

STTA206S

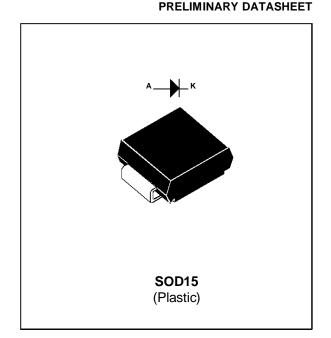
TURBOSWITCH ™ "A". ULTRA-FAST HIGH VOLTAGE DIODE

MAIN PRODUCTS CHARACTERISTICS

lf(av)	2A		
V _{RRM}	600V		
t_{rr} (typ)	20ns		
V _F (max)	1.5V		

FEATURES AND BENEFITS

- SPECIFIC TO "FREEWHEEL MODE" OPERA-TIONS: FREEWHEEL OR BOOSTER DIODE
- ULTRA-FAST AND SOFT RECOVERY
- VERY LOW OVERALL POWER LOSSES IN BOTH THE DIODE AND THE COMPANION TRANSISTOR
- HIGH FREQUENCY OPERATIONS
- SURFACE MOUNT DEVICE



DESCRIPTION

The TURBOSWITCH is a very high performance series of ultra-fast high voltage power diodes from 600V to 1200V.

TURBOSWITCH "A" family drastically cuts losses in both the diode and the associated switching IGBT or MOSFET in all "Freewheel Mode" operations and is particulary suitable and efficient in Motor Control Freewheel applications and in Booster diode applications in Power Factor Control circuitries.

Packaged in SOD15 surface mount envelope, these 600V devices are particularly intended for use on 240V domestic mains.

Symbol	Parameter	Value	Unit
V _{RRM}	Repetitive Peak Reverse Voltage	600	V
V _{RSM}	Non Repetitive Peak Reverse Voltage	600	V
I _{F(RMS)}	RMS Forward Current	8	А
IFRM	Repetitive Peak Forward Current (tp = $5 \mu s$, f = $5 kHz$)	50	А
Tj	T _j Max. Operating Junction Temperature		°C
T _{stg}	T _{stg} Storage Temperature range		°C

ABSOLUTE MAXIMUM RATINGS

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THERMAL AND POWER DATA

Symbol	Parameter	Conditions	Value	Unit
R _{th} (j-I)	Junction to Lead Thermal Resistar	21	°C/W	
P ₁	Conduction Power Dissipation (see fig. 2)	$I_{F(AV)} = 1.5A \delta = 0.5$ Tlead= 72°C	2.5	W
P _{max}	Total Power Dissipation Pmax = P1 + P3 (P3 = 10% P1)	Tlead= 67°C	2.8	W

STATIC ELECTRICAL CHARACTERISTICS (see Fig. 2)

Symbol	Parameter	Test Conditions		Min	Тур	Max	Unit
VF *	Forward Voltage Drop	I _F = 2A	Tj = 25℃ Tj = 125℃		1.1	1.75 1.5	V
I _R **	Reverse Leakage Current	V _R = 0.8 x V _{RRM}	Tj = 25℃ Tj = 125℃		400	20 1200	μA

Test pulses widths : $\ ^{*}$ tp = 380 $\mu s,$ duty cycle < 2%

** tp = 5 ms , duty cycle < 2%

DYNAMIC ELECTRICAL CHARACTERISTICS

TURN-OFF SWITCHING (see Fig. 3)

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
trr	Reverse Recovery Time	$ \begin{array}{l} Tj = 25 ^{\circ}C \\ I_F = 0.5 \ A \\ I_R = 1A \\ I_F = 1 \ A \\ dI_F/dt = -50 A/\mu s \\ V_R = 30V \end{array} $		20	50	ns
I _{RM}	Maximum Recovery Current	Tj = 125°C VR = 400V I _F = 2A dI _F /dt = -16 A/μs dI _F /dt = -50 A/μs		2.0	1.2	A
S factor	Softness factor	Tj = 125°C V _R = 400V I _F = 2A dI _F /dt = -50 A/μs		TBD		/

TURN-ON SWITCHING (see Fig.8)

Symbol	Parameter	Test Conditions	Min	Тур	Max	Unit
t _{fr}	Forward Recovery Time	Tj = 25°C $I_F = 1 A$ $dI_F/dt = 8 A/\mu s$ measured at, $1.1 \times V_F$ max			500	ns
V _{Fp}	Peak Forward Voltage				10	V



APPLICATION DATA

The TURBOSWITCHTM "A" is especially designed to provide the lowest overall power losses in any "Freewheel Mode" application (see fig. 1) considering both the diode and the companion transistor, thus optimizing the overall performance in the end application.

The way of calculating the power losses is given below :

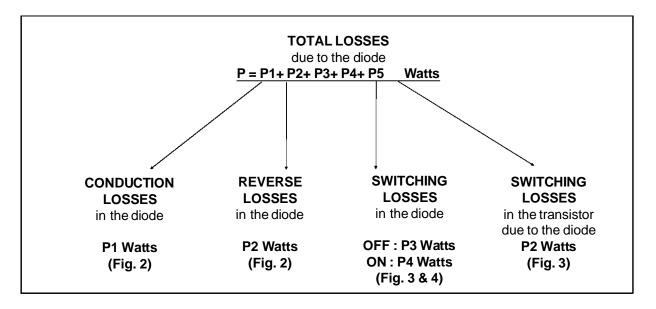
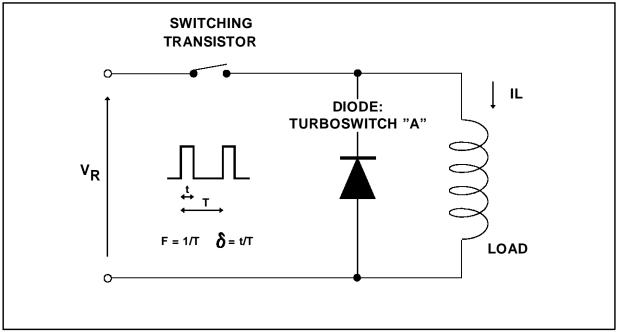


Fig. 1 : "FREEWHEEL" MODE





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APPLICATION DATA (Cont'd)

Fig. 2 : STATIC CHARACTERISTICS

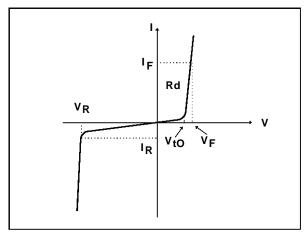


Fig. 3 : TURN-OFF CHARACTERISTICS

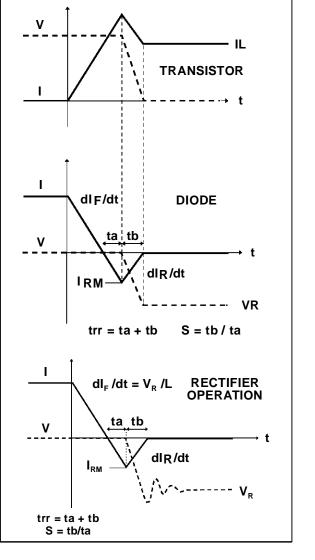
Conduction losses :

 $P1 = V_{t0} \times I_{F(AV)} + R_d \times I_{F}^2(RMS)$

with

Reverse losses :

 $P2 = VR \times IR \times (1 - \delta)$



Turn-on losses : (in the transistor, due to the diode)

$$P5 = \frac{V_R \times I_{RM}^2 \times (3 + 2 \times S) \times F}{6 \times dI_F/dt} + \frac{V_R \times I_{RM} \times I_L \times (S + 2) \times F}{2 \times dI_F/dt}$$

Turn-off losses (in the diode):

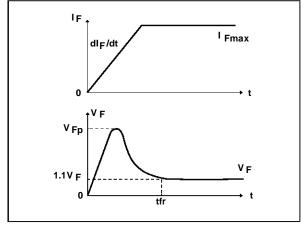
$$P3 = \frac{V_R \times I_{RM}^2 \times S \times F}{6 \times dI_F/dt}$$

P3 and P5 are suitable for power MOSFET and IGBT



APPLICATION DATA (Cont'd)

Fig. 4 : TURN-ON CHARACTERISTICS



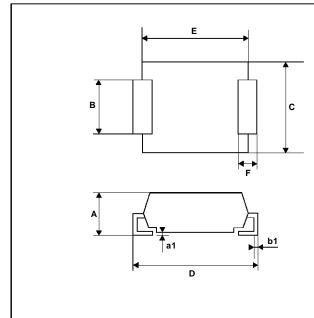
Ratings and characteristics curves are ON GOING.

Turn-on losses : P4 = 0.4 (VFP - VF) x I_{Fmax} x t_{fr} x F



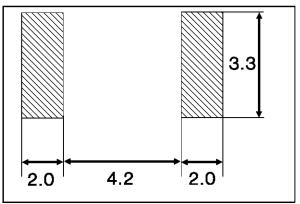
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PACKAGE MECHANICAL DATA SOD15 Plastic



	DIMENSIONS			
REF.	Millimeters Min. Max.		Inches	
			Min.	Max.
А	2.50	3.10	0.098	0.122
a1	0.05	0.20	0.002	0.008
В	2.90	3.10	0.114	0.122
b1	0.29	0.32	0.011	0.012
С	4.80	5.20	0.189	0.204
D	7.60	8.00	0.299	0.315
Е	6.30	6.60	0.225	0.259
F	1.30	1.70	0.051	0.056

FOOTPRINT DIMENSIONS SOD15 Plastic



Marking : T51 Laser marking Logo indicates cathode

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